

WHAT IS CLAIMED IS:

1. A method for manufacturing carbon fibers by means of a thermal CVD method, said method comprising at least the step of heating a substrate including a catalyst layer arranged on a surface of said substrate in a depressurised atmosphere including a carbon containing gas to grow carbon fibers from said catalyst layer, wherein a partial pressure of the carbon containing gas is  $1/1000$  or less of a total pressure of the reduced pressure atmosphere, and is 10 Pa or less.

2. A method for manufacturing carbon fibers by means of a thermal CVD method, said method comprising at least the step of heating a substrate including a catalyst layer arranged on a surface of said substrate in a depressurised atmosphere including a carbon containing gas to grow carbon fibers from said catalyst layer, wherein a total pressure of the reduced pressure atmosphere is 2000 Pa or less, and a partial pressure of the carbon containing gas is 10 Pa or less.

3. A method for manufacturing carbon fibers by means of a thermal CVD method, said method comprising at least the step of heating a substrate including a catalyst layer arranged on a surface of said

substrate in a depressurised atmosphere including a carbon containing gas to grow carbon fibers from said catalyst layer, wherein a total pressure of the reduced pressure atmosphere is 600 Pa or less, and a  
5 partial pressure of the carbon containing gas is 10 Pa or less.

4. A method for manufacturing carbon fibers according to claim 1, wherein the partial pressure of  
10 the carbon containing gas is 1 Pa or less.

5. A method for manufacturing carbon fibers according to claim 2, wherein the partial pressure of the carbon containing gas is 1 Pa or less.  
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6. A method for manufacturing carbon fibers according to claim 3, wherein the partial pressure of the carbon containing gas is 1 Pa or less.

20 7. A method for manufacturing carbon fibers according to claim 1, wherein said carbon containing gas is introduced into the depressurised atmosphere together with a carrier gas.

25 8. A method for manufacturing carbon fibers according to claim 7, wherein said carrier gas is a hydrogen gas.

9. A method for manufacturing carbon fibers according to claim 7, wherein said carrier gas is an inert gas.

5           10. A method for manufacturing carbon fibers according to claim 1, wherein said carbon containing gas is a carbon hydride gas.

10           11. A method for manufacturing carbon fibers according to claim 1, wherein said carbon containing gas is an acetylene gas.

15           12. A method for manufacturing carbon fibers according to claim 2, wherein said carbon containing gas is an acetylene gas.

20           13. A method for manufacturing carbon fibers according to claim 3, wherein said carbon containing gas is an acetylene gas.

            14. A method for manufacturing carbon fibers according to claim 1, wherein said catalyst layer is composed of a plurality of catalyst particles.

25           15. A method for manufacturing carbon fibers according to claim 1, wherein said catalyst layer is composed of a plurality of catalyst particles, and

said catalyst particles are made of an alloy of Pd and Co.

16. A method for manufacturing carbon fibers  
5 according to claim 2, wherein said catalyst layer is composed of a plurality of catalyst particles, and said catalyst particles are made of an alloy of Pd and Co.

10 17. A method for manufacturing carbon fibers according to claim 3, wherein said catalyst layer is composed of a plurality of catalyst particles, and said catalyst particles are made of an alloy of Pd and Co.

15 18. A method for manufacturing carbon fibers according to claim 1, wherein said carbon fibers are graphite nanofibers.

20 19. A method for manufacturing an electron-emitting device using carbon fibers as electron-emitting members, wherein said carbon fibers are manufactured by a manufacturing method according to claim 1.

25 20. A method for manufacturing an electron source composed of a plurality of electron-emitting

devices arranged on a substrate, wherein said electron-emitting devices are manufactured by a manufacturing method according to claim 19.

5           21. A method for manufacturing an image display apparatus including an electron source and an image-forming member arranged to be opposed to said electron source, wherein said electron source is manufactured by a manufacturing method according to  
10 claim 20.

          22. A method for manufacturing a light bulb including an electron-emitting body using carbon fibers as electron-emitting members, and a light-  
15 emitting member, wherein said carbon fibers are made by a manufacturing method according to claim 1.

          23. A method for manufacturing a secondary battery using carbon fibers as cathodes, wherein said  
20 carbon fibers are manufactured by a manufacturing method according to claim 1.